All India Test Series (2023-24)

Test Code: ANY/05

AITS TEST - 05

Yakeen NEET

DURATION: 200 Minutes | **DATE: 31/03/2024** | **M. MARKS: 720**

Topics Covered

Physics:	AITS-4 + Moving Charges and Magnetism, Magnetism and Matter {excluding Earth magnetism}, Electromagnetic Induction, Alternating Current (excluding LC Oscillations), Electromagnetic Waves
Chemistry:	AITS-4 + Chemical kinetics, Chemical bonding and molecular structure, Alcohols, Phenols and Ethers Electrochemistry
Botany:	AITS-4 + Principles of Inheritance and Variation, Microbes in Human Welfare, Organisms and Population, Ecosystem
Zoology:	AITS-4 + Human Reproduction, Reproductive Health, Human Health and Disease

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   Candidates are advised to read all 15 questions in each subject of Section-B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

OMR Instructions:

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS): _____

Roll Number: _____

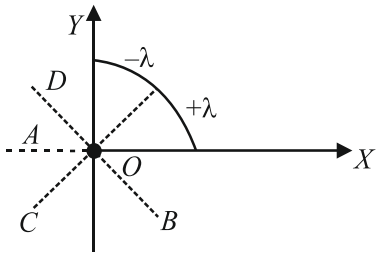
OMR Bar Code Number: _____

Student's Signature: _____ Invigilator's Signature _____

(PHYSICS)

SECTION-A

1. A charged quarter ring is placed in the *X*-*Y* plane with its center at the origin as shown. The ring has uniform positive charge on the half part and the other half has uniformly distributed negative charge. The direction of net electric field due to the quarter ring at the origin is along; (λ is the linear charge density)



(1) *OA*
(2) *OB*
(3) *OC*
(4) *OD*

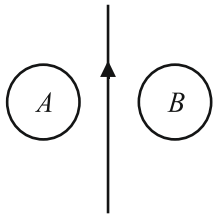
2. The gravitational potential at the center of a uniform semicircular ring of mass *M* and radius 2*R* is;

(1) $-\frac{GM}{R}$ (2) $-\frac{GM}{2R}$
(3) $\frac{GM}{2R}$ (4) $\frac{GM}{R}$

3. According to Curie's law, the magnetic susceptibility of a paramagnetic substance at an absolute temperature *T* is proportional to;

(1) $\frac{1}{T}$ (2) T
(3) $\frac{1}{T^2}$ (4) T^2

4. *A* and *B* are two metallic rings placed on opposite sides of an infinitely long straight conducting wire as shown. If current in the wire is slowly decreased, the direction of induced current will be:



(1) clockwise in *A* and anticlockwise in *B*
(2) anticlockwise in *A* and clockwise in *B*
(3) clockwise in both *A* and *B*
(4) anticlockwise in both *A* and *B*

5. An AC voltage source of variable angular frequency ω and fixed amplitude *V* is connected in series with a capacitance *C* and an electric bulb of resistance *R* (inductance zero). When ω is increased;

(1) the bulb glows dimmer
(2) the bulb glows brighter
(3) total impedance of the circuit is unchanged
(4) total impedance of the circuit increases

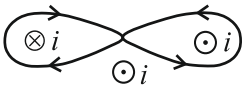
6. A solid non conducting sphere has uniformly distributed charge with volume charge density ρ. The magnitude of electric field at a distance *r* from the center inside the sphere is;

(1) $\frac{\rho r}{3\varepsilon_0}$
(2) $\frac{\rho r}{2\varepsilon_0}$
(3) $\frac{\rho r}{\varepsilon_0}$
(4) $\frac{2\rho r}{\varepsilon_0}$

7. The electric current increases linearly from 4 A to 10 A in 4 s. Then the magnitude of average current for this interval may be;

(1) 8 A
(2) 6 A
(3) 5 A
(4) 7 A

8. There are three wires carrying current *i* perpendicular to the plane of the loop shown below. The value of $\oint \vec{B}.d\vec{l}$ over the loop is;

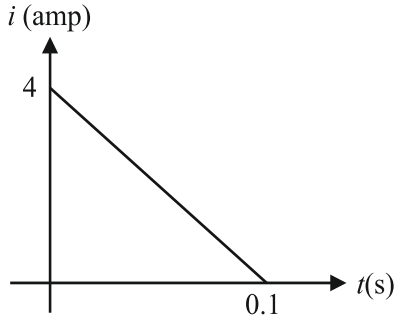


(1) $\mu_0 i$
(2) $2\mu_0 i$
(3) $4\mu_0 i$
(4) Zero

9. In series *LR* circuit, inductive reactance $X_L = 3R$ where *R* is the resistance. Now a capacitor with capacitive reactance $X_C = R$ is added in series. Find the ratio of new to old power factor.

(1) 1 (2) 2
(3) $\frac{1}{\sqrt{2}}$ (4) $\sqrt{2}$

10. Some magnetic flux is changed in a coil of resistance 10 ohm. As a result, an induced current is developed in it, which varies with time as shown in figure. The magnitude of change in flux through the coil in Webers is; (Neglect self-inductance of the coil)

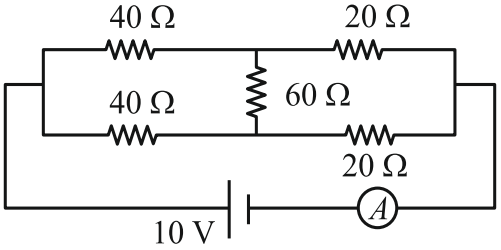


(1) 2
(2) 4
(3) 6
(4) 8

11. Electromagnetic wave of intensity 1400 W/m^2 falls normally on metal surface of area 1.5 m^2 and is completely reflected. Find out the force exerted by the beam on the surface.

(1) 7×10^{-6} N
(2) 14×10^{-6} N
(3) 14×10^{-8} N
(4) 7×10^{-8} N

12. The current measured by ammeter in the given circuit is;



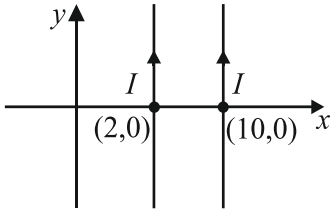
(1) 0.11 A
(2) 0.22 A
(3) 0.33 A
(4) 0.44 A

13. Two particles *x* and *y* having equal charges and equal kinetic energies enter a uniform magnetic field and describe circular path of radius of curvature r_1 and r_2 respectively, then the ratio of their masses is;

(1) $\left(\frac{r_1}{r_2}\right)$ (2) $\left(\frac{r_1}{r_2}\right)^{\frac{1}{2}}$

(3) $\left(\frac{r_1}{r_2}\right)^2$ (4) $\left(\frac{r_2}{r_1}\right)$

14. Two long straight wires located in *X*-*Y* plane are placed parallel to the *y*-axis. Both the wires carry equal current (*I*) in the same direction as shown. Find coordinates of a point on the *x*-axis where net magnetic field is zero,



(1) (5, 0)
(2) (6, 0)
(3) (7, 0)
(4) (6.5, 0)

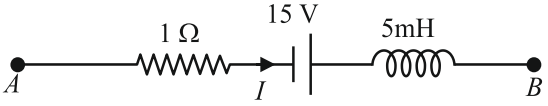
15. If alternating current in a circuit is given by: $I = I_0 \sin 2\pi nt$, then the minimum time taken by the current to change from rms value to zero is equal to;

(1) $\left(\frac{1}{n}\right)$
(2) $\left(\frac{1}{2n}\right)$
(3) $\left(\frac{1}{4n}\right)$
(4) $\left(\frac{1}{8n}\right)$

16. A solid cylindrical wire of radius '*R*' carries a current *I*. Find the ratio of magnetic fields at points which are located at $\frac{R}{2}$ and 2*R* distance away from the axis of the wire;

(1) 1 : 1
(2) 1 : 2
(3) 2 : 1
(4) 1 : 4

17. The network shown in the figure is part of a complete circuit. What is the potential difference $V_B - V_A$, when the current *I* is 5 A and is decreasing at a rate of $10^3 \frac{A}{s}$?



(1) +15 V
(2) –15 V
(3) 10 V
(4) –10 V

18. **Assertion (A):** In electromagnetic waves electric field and magnetic field vectors are perpendicular to each other.

Reason (R): Electric field and magnetic field in an electromagnetic wave are self-sustaining.

(1) Both **Assertion** and **Reason** are true and the **Reason** is correct explanation of the **Assertion.**

(2) Both **Assertion** and **Reason** are true but **Reason** is not the correct explanation of **Assertion.**

(3) **Assertion** is true, but the **Reason** is false.

(4) **Assertion** is false but the **Reason** is true.

19. A 100 V AC source of angular frequency 500 rad/s is connected to a LCR series circuit with $L = 0.8$ H, $C = 5\ \mu F$ and $R = 10\ \Omega$. The potential difference across the resistance is;

(1) $\frac{100}{\sqrt{2}}$ V (2) 100 V

(3) 50 V (4) $50\sqrt{3}$ V

20. An electric dipole, when held at 60° with respect to a uniform electric field 10^4 N/C, experiences a torque of $\sqrt{3}\times10^{-24}$ Nm. Calculate dipole moment of the dipole.

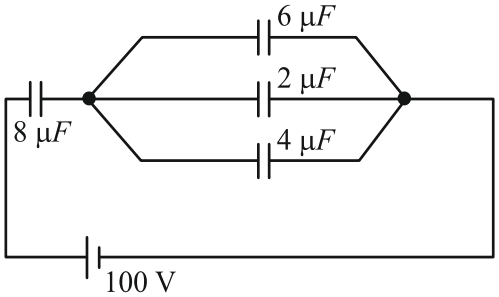
(1) 4×10^{-21} Cm

(2) 2×10^{-8} Cm

(3) 2×10^{-28} Cm

(4) $\sqrt{3}\times10^{-16}$ Cm

21. Find the charge stored on 8 μF capacitor in the given circuit.



(1) 480 μC (2) 200 μC

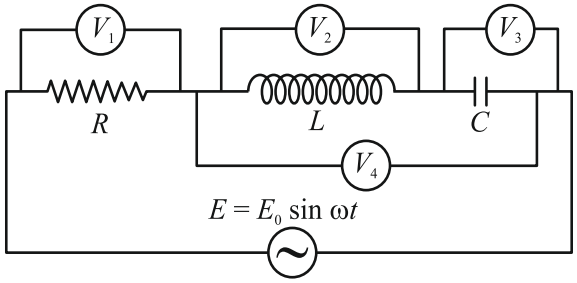
(3) 400 μC (4) 1200 μC

22. A square current carrying loop is suspended in a uniform magnetic field acting in the plane of the loop. If the force on one arm of the loop is $\vec{F}$, then the net force on the remaining three arms of the loop is;

(1) $\vec{F}$ (2) $3\vec{F}$

(3) $-\vec{F}$ (4) $-3\vec{F}$

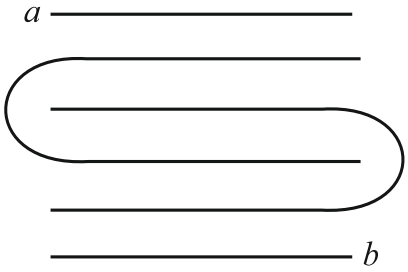
23. In the given figure, which of the four voltmeters V_1, V_2, V_3 and V_4 will show zero voltage at resonant frequency?



(1) V_1 (2) V_2

(3) V_3 (4) V_4

24. Six metal plates each of area A are placed parallel to each other with separation between adjacent plates as d. The equivalent capacitance between points 'a' and 'b' is;



(1) $\frac{\varepsilon_0 A}{7d}$ (2) $\frac{2\varepsilon_0 A}{d}$

(3) $\frac{3\varepsilon_0 A}{7d}$ (4) $\frac{4\varepsilon_0 A}{d}$

25. 8 identical droplets are charged to potential V each. If they coalesce to form a single drop, then its potential will be;

(1) V (2) $2\ V$

(3) $4\ V$ (4) $\frac{V}{2}$

26. Considering Earth as a uniform solid sphere, the acceleration due to gravity is maximum at;

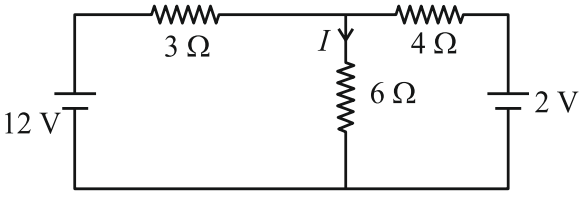
(1) the center of Earth.

(2) the surface of Earth.

(3) some point inside the Earth.

(4) some point outside the Earth.

27. The value of current I in given figure is;



(1) 1 A

(2) 2 A

(3) 4 A

(4) 6 A

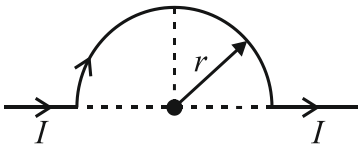
28. A coil having 500 square loops each of side 10 cm is placed normal to a magnetic field which increases at a rate of 1.0 T/s. The induced emf (in volt) is;

(1) 0.1
(2) 0.5
(3) 1.0
(4) 5.0

29. Which of the following conclusions can be drawn from the result $\oint \vec{B}.d\vec{A} = 0$? (symbols have usual meanings)

(1) Magnetic field is zero everywhere
(2) Magnetic monopole cannot exist
(3) Magnetic lines of forces do not intersect each other
(4) A current produces magnetic field

30. Current *I* is flowing in a conductor shaped as shown in the figure. The radius of the curved path is *r* and the length of the straight portion is very large. The value of the magnetic field at the centre of the semi-circle will be:



(1) $\frac{\mu_0 I}{2r}$ (2) $\frac{\mu_0 I}{2\pi r}$
(3) $\frac{\mu_0 I}{4r}$ (4) $\frac{\mu_0 I}{4\pi r}$

31. Which of the following vectors are perpendicular to each other in the relation for magnetic force $\vec{F}$ acting on a charged particle? (symbols have usual meaning)

(1) $\vec{F}$ and $\vec{V}$
(2) $\vec{F}$ and $\vec{B}$
(3) $\vec{V}$ and $\vec{B}$
(4) Both (1) and (2)

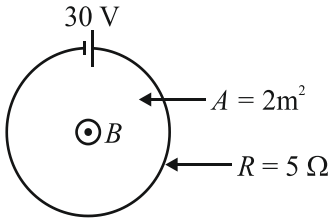
32. In a uniform magnetic field *B*, a wire in the form of a circle of radius *r* rotates about the diameter of the circle with an angular frequency ω. The axis of rotation is perpendicular to the field. If the total resistance of the circuit is *R*, then the mean power generated per period of rotation is;

(1) $\frac{\pi r^2 \omega B}{2R}$ (2) $\frac{(\pi r^2 \omega B)^2}{2R}$
(3) $\frac{(\pi r \omega B)^2}{2R}$ (4) $\frac{(\pi r^2 \omega B)^2}{8R}$

33. Relation between μ_r and χ will be: (symbols have usual meaning)

(1) $\mu_r = 1 + \chi$
(2) $\chi = \mu_r + 1$
(3) $\frac{\mu_0}{\mu_r} = \chi$
(4) $\mu_r = \mu_0 \chi$

34. Figure shows a coil placed in a magnetic field decreasing at a rate of 10 T/s. There is also a source of emf 30 V in the coil. Find the magnitude and direction of the current in the coil.



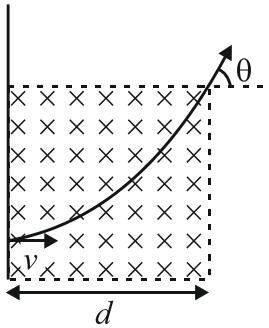
(1) 2 A clockwise
(2) 2 A anticlockwise
(3) 1 A clockwise
(4) 1 A anticlockwise

35. Two bulb of power rating 100 W and 220 V are connected in series across a 220 V supply. The power consumed in circuit will be;

(1) 50 W
(2) 100 W
(3) 200 W
(4) 25 W

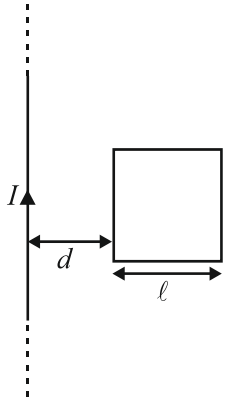
SECTION-B

36. A particle of mass *m* and charge *q* is projected horizontally with speed *v* into a region having a perpendicular uniform magnetic field *B* of width *d* as shown in the figure. Find the angle of deviation θ of the particle as it comes out of the magnetic field.



(1) $\cos^{-1}\left(\frac{dBq}{mv}\right)$ (2) $\sin^{-1}\left(\frac{dBq}{mv}\right)$
(3) $\cos^{-1}\left(\frac{mv}{dBq}\right)$ (4) $\sin^{-1}\left(\frac{mv}{dBq}\right)$

37. A square loop of side ℓ is placed at a distance d from a long straight wire carrying current I. The magnetic flux through the square loop is;



(1) $\frac{\mu_0 I\ell}{2\pi}\ell n\left(\frac{d+\ell}{d}\right)$

(2) $\frac{\mu_0 I\ell}{4\pi}\ell n\left(\frac{d+\ell}{d}\right)$

(3) $\frac{\mu_0 I}{4\pi\ell}\ell n\left(\frac{d+\ell}{d}\right)$

(4) $\frac{\mu_0 I}{2\pi\ell}\ell n\left(\frac{d+\ell}{d}\right)$

38. Relative permittivity and permeability of a material are ε_r and μ_r respectively. Which of the following values of these quantities are possible for a diamagnetic material?

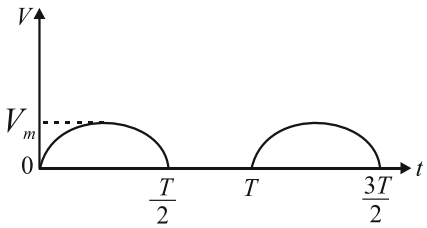
(1) $\varepsilon_r = 0.5, \mu_r = 1.5$

(2) $\varepsilon_r = 1.5, \mu_r = 0.5$

(3) $\varepsilon_r = 0.5, \mu_r = 0.5$

(4) $\varepsilon_r = 1.5, \mu_r = 1.5$

39. From the following graph, find the RMS value of the alternating voltage for a complete cycle. (The curves represent sinusoidal variation)



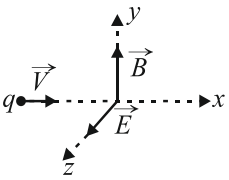
(1) $\frac{V_m}{\sqrt{2}}$

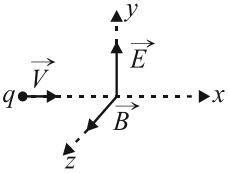
(2) $\frac{2V_m}{\pi}$

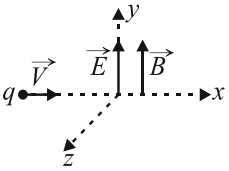
(3) $\frac{V_m}{2}$

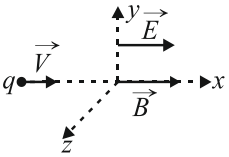
(4) $\frac{V_m}{\sqrt{3}}$

40. A particle of charge q and mass m is moving along the x-axis with a velocity v and enters a region of electric field $\vec{E}$ and magnetic field $\vec{B}$ as shown in figure below. For which of the option given below the net force on the charge may be zero?

(1) 

(2) 

(3) 

(4) 

41. If the magnetic susceptibility of a magnetic material is –0.004 then its nature will be;

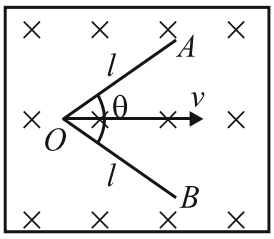
(1) Diamagnetic

(2) Paramagnetic

(3) Ferromagnetic

(4) Cannot be determined

42. An angle AOB made of a conducting wire moves along its bisector through a magnetic field B with speed v as given in the figure. Find the emf induced between the two free ends if the magnetic field is perpendicular to the plane. ($OA = OB = l$)



(1) $Blv\sin\left(\frac{\theta}{2}\right)$

(2) $2Blv\sin\left(\frac{\theta}{2}\right)$

(3) $Blv\cos\left(\frac{\theta}{2}\right)$

(4) $2Blv\cos\left(\frac{\theta}{2}\right)$

43. A coil and a bulb are connected in series with a 5 V dc source. When a soft-iron core is inserted in the coil, the light emerging from the bulb (after a long time) will;

(1) increase (2) decrease

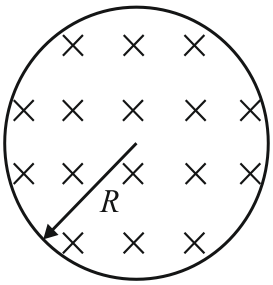
(3) remains same (4) cannot be determined

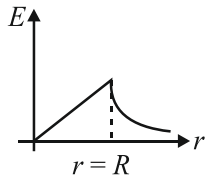
44. An ideal transformer (step up) with turn ratio 1 : 8 has 60 Hz, 120 V across the primary. The load in the secondary is 10^4 Ω. Find the current in the secondary.

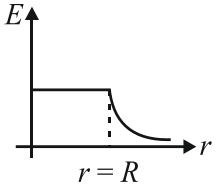
(1) 80 mA (2) 96 mA

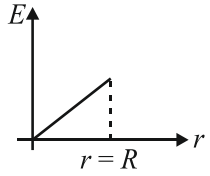
(3) 48 mA (4) 16 mA

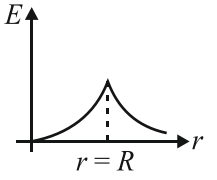
45. A cylindrical space of radius R is filled with a uniform magnetic induction B parallel to the axis of the cylinder. If B changes at a constant rate with respect to time, the graph showing the variation of induced electric field with distance r from the axis of cylinder is;



(1) 

(2) 

(3) 

(4) 

46. Two conducting spheres A and B are placed far apart from each other. The sphere A has radius R and charge Q while the sphere B has radius $4R$ and charge $2Q$. On connecting both sphere by a connecting wire;

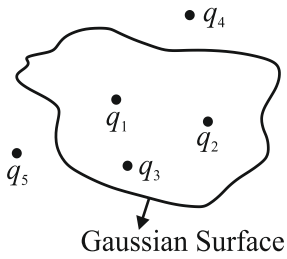
(1) some charge flows from A towards B, such that both spheres have equal potential.

(2) some charge flows from B towards A, such that both spheres have equal potential.

(3) some charge flows from A towards B, such that both spheres have equal charges.

(4) some charge flows from B towards A, such that both spheres have equal charges.

47. The figure below represents a Gaussian surface. On applying Gauss law on this surface, the electric field in the equation $\oint \vec{E}.\vec{dS}$ is due to;



(1) q_1, q_2 and q_3

(2) q_4 and q_5

(3) q_1, q_2, q_3 and q_4

(4) all the charges q_1, q_2, q_3, q_4 and q_5

48. If $\vec{E}$ and $\vec{B}$ are the electric and magnetic field vectors of electromagnetic wave, then the direction of propagation of electromagnetic wave is along;

(1) $\vec{E}$ (2) $\vec{B}$

(3) $\vec{E}\times\vec{B}$ (4) $\vec{B}\times\vec{E}$

49. A simple pendulum consists of a small sphere of mass m suspended using a string of length L. A positive charge q is given to the sphere and an electric field E is applied vertically upwards. The time period of the oscillation is;

(1) $2\pi\sqrt{\dfrac{2L}{g-\dfrac{qE}{m}}}$

(2) $2\pi\sqrt{\dfrac{L}{g-\dfrac{qE}{m}}}$

(3) $\dfrac{1}{2\pi}\sqrt{\dfrac{g-qE}{L}}$

(4) $2\pi\sqrt{\dfrac{L}{g+\dfrac{qE}{m}}}$

50. In a LR circuit, current at $t = 0$ is 20 A. After 2 s it reduces to 18 A. The time constant of the circuit (in second) is;

(1) $\ln\left(\dfrac{10}{9}\right)$

(2) 2

(3) $\dfrac{2}{\ln\left(\dfrac{10}{9}\right)}$

(4) $2\ln\left(\dfrac{10}{9}\right)$

(CHEMISTRY)

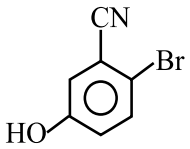
SECTION-A

51. Which of the following molecules is/are polar?
(1) H_2O (2) PH_3
(3) SO_2 (4) All of these

52. The **correct** decreasing order of dipole moment in the following compounds is;
(1) $HF > H_2O > NH_3 > HCl > NF_3$
(2) $NF_3 > HF > H_2O > HCl > NH_3$
(3) $NF_3 > HCl > NH_3 > HF > H_2O$
(4) $NF_3 > H_2O > HCl > HF > NH_3$

53. Which of the following species will show resonance?
(1) Ozone
(2) Nitrate ion
(3) Sulphate ion
(4) All of these

54. The IUPAC name of the following compound is;



(1) 4-Bromo-3-cyanophenol
(2) 2-Bromo-5-hydoxybenzonitrile
(3) 2-Cyclo-4-hydroxybromobenzene
(4) 6-Bromo-3-hydroxybenzonitrile

55. Match the **List-I** with **List-II** and choose the **correct** option.

List-I (species)		**List-II (Bond order and magnetic character)**	
(A)	O_2^+	(I)	1 and diamagnetic
(B)	O_2	(II)	$1\frac{1}{2}$ and paramagnetic
(C)	O_2^-	(III)	2 and paramagnetic
(D)	O_2^{2-}	(IV)	$2\frac{1}{2}$ and paramagnetic

(1) A-IV, B-III, C-II, D-I
(2) A-I, B-III, C-II, D-IV
(3) A-IV, B-III, C-I, D-II
(4) A-IV, B-II, C-III, D-I

56. **Assertion (A):** The bond order of C_2 molecules is 2.
Reason (R): C_2 molecule has one sigma and one pi bond as per MOT.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

57. **Statement I:** The hybridisation of Ni in $[Ni(CN)_4]^{2-}$ is sp^3.
Statement II: The shape of $[Ni(CN)_4]^{2-}$ is square planar.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

58. The d orbital used in sp^3d triagonal bipyramidal geometry is;
(1) d_{z^2} (2) $d_{x^2-y^2}$
(3) d_{xy} (4) d_{yz}

59. What is the osmotic pressure of an urea solution at 25°C which contains 50 g of urea dissolved in 1000 cm^3 of solution?
(1) 20.39 atm (2) 10.4 atm
(3) 40.8 atm (4) 18 atm

60. For solution showing negative deviation from Raoult's law, which of the following is **correct**?
(1) $P_A < P_A^0 X_A$ and $P_B < P_B^0 X_B$
(2) $\Delta H_{mixing} < 0$
(3) $\Delta V_{mixing} > 0$
(4) Both (1) and (2)

61. A solution containing 12.5 g of a non-electrolyte substance in 200 g of water gave boiling point elevation of 1K. calculate the molar mass of the substance;
(K_b for water = 0.52 K kg mol^{-1})
(1) 30
(2) 35
(3) 32.5
(4) 42.5

62. The degree of dissociation of $Ca(NO_3)_2$ in a dilute aqueous solution at 100ºC is 70%. Calculate Van't hoff factor (i) for this solution;
(1) 3
(2) 2.4
(3) 2.8
(4) 2.9

63. The unit of specific conductivity is;
(1) $ohm^{-1}\ cm^{-1}$
(2) $\Omega^{-1}\ cm^{-1}$
(3) $S\ cm^{-1}$
(4) All of these

64. A 0.01M NaOH solution offered a resistance of 30 ohm in a conductivity cell. If the cell constant is 0.30 cm^{-1}, what is the molar conductivity of NaOH at this concentration?
(1) 1000 $ohm^{-1}\ cm^2\ mol^{-1}$
(2) 2000 $ohm^{-1}\ cm^2\ mol^{-1}$
(3) 500 $ohm^{-1}\ cm^2\ mol^{-1}$
(4) 100 $ohm^{-1}\ cm^2\ mol^{-1}$

65. **Statement I:** For a weak electrolyte there is a steep rise in the molar conductivity of the solution on dilution.
Statement II: As dilution increases, ionisation of weak electrolyte increases.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

66. Ionic conductance at infinite dilution of Al^{3+} and SO_4^{2-} ions are 190 and 160 $ohm^{-1}\ cm^2\ mol^{-1}$ respectively. What is molar conductance of $Al_2(SO_4)_3$ at infinite dilution?
(1) 858 $ohm^{-1}\ cm^2\ mol^{-1}$
(2) 860 $ohm^{-1}\ cm^2\ mol^{-1}$
(3) 870 $ohm^{-1}\ cm^2\ mol^{-1}$
(4) 760 $ohm^{-1}\ cm^2\ mol^{-1}$

67. The standard reduction potential values of four metals A, B, C and D are –2.93, +0.34, –3.05 and +0.74 volts respectively. The **correct** increasing order of reducing power is;
(1) A < B < C < D
(2) B < D < C < A
(3) D < B < A < C
(4) B < C < D < A

68. Calculate the standard Gibbs free energy for the given cell reaction,
$Ni|Ni^{2+}(1M)||Ag^{+}(1M)|Ag, \text{if } E^0_{Ni^{2+}/Ni} = -0.25V$
and $E^0_{Ag^{+}/Ag} = 0.80V$.
(1) –241250 J
(2) –202650 J
(3) +202650 J
(4) +241250 J

69. How much charge is required to reduce 1.5 moles of MnO_4^- in acidic medium?
(1) 700000 C
(2) 650000 C
(3) 723750 C
(4) 482500 C

70. **Assertion (A):** For free energy change and equilibrium constant, the value of $\Delta G^o = 2.303 \log K_C$.
Reason (R): At equilibrium, change in Gibbs free energy is equal to zero.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

71. The rate of formation of a dimer in a second order dimerisation reaction is 9.5×10^{-4} mol L^{-1} s^{-1} at 0.02 mol L^{-1} monomer concentration. What is the value of rate constant?
(1) 2.0 mol^{-1} L sec^{-1}
(2) 2.4 mol^{-1} L sec^{-1}
(3) 3.0 mol^{-1} L sec^{-1}
(4) 3.4 mol^{-1} L sec^{-1}

72. Which of the following is **correct** for first order reaction?
(1) $t_{\frac{1}{2}} = \frac{0.693}{k}$
(2) $\text{slope} = \frac{-2.303}{k}$ of graph between $\log \frac{[A]_0}{[A]_t}$ versus time
(3) $K = \frac{-2.303}{t} \frac{[A]}{[A_0]}$
(4) Both (1) and (3)

73. For a first order reaction, it takes 1 minute for the initial concentration of 0.6 mol L^{-1} to become 0.3 mol L^{-1}. How long will it take for the initial concentration to become 0.1 mol L^{-1}?
[log 6 = 0.7781]
(1) 1.58 min (2) 2.58 min
(3) 3 min (4) 1.70 min

74. Which of the following is **incorrect** for Arrhenius equation?
(1) The equation provides a relationship between the rate constant (k) and the temperature of the system.
(2) Frequency factor (A) gives the frequency of binary collisions of reactant molecules per second per litre.
(3) As temperature increases, the value of k decreases and hence the rate of reaction decreases.
(4) None of these

75. The slope of the line in the graph of log k versus $\frac{1}{T}$ for a reaction is –5000. What is the energy of activation for this reaction?
[R = 8.314 JK^{-1} mol^{-1}]
(1) 95.73 kJ mol^{-1} (2) 111.8 kJ mol^{-1}
(3) 99.73 kJ mol^{-1} (4) –95.73 kJ mol^{-1}

76. **Statement I:** Molecularity has no meaning for complex reaction.
Statement II: The molecularity of reaction more than 3 is very rare.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

77. In a reaction A + B $\rightarrow$ product, rate is doubled when the concentration of B doubled, and rate increases by a factor of 8 when concentrations of both the reactants (A) and (B) are doubled. Rate law for the reactions is;
(1) Rate = $k[A][B]^2$ (2) Rate = $k[A]^2[B]^2$
(3) Rate = $k[A][B]$ (4) Rate = $k[A]^2[B]$

78. Which of the following does **not** show geometrical isomerism?
(1) $CH_3–CH=CH–CH_3$
(2) $CH_3–CH_2–HC=CH_2$
(3) $CH_3–\underset{\underset{Cl}{|}}{C}=CH–CH_3$
(4) $ClHC=CH–CH_2–CH_3$

79. The major product (B) of the following reactions is;

$$CH_3COOCH_3 \xrightarrow{LiAlH_4} A \xrightarrow[\Delta]{conc.HCl,anhy.ZnCl_2} B$$

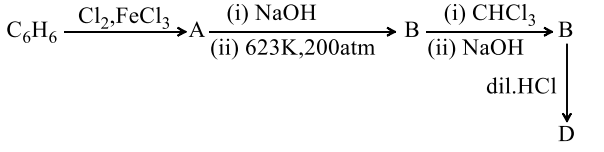
(1) CH_3CH_2OH
(2) CH_3CH_2Cl
(3) CH_3CHO
(4) $(CH_2)_2Cl_2$

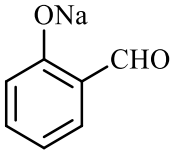
80. $A + CH_3MgBr \longrightarrow B \xrightarrow{H^+/H_2O} \text{Tert-butyl alcohol}$
A in the above reaction is;
(1) $CH_3CH_2COCH_3$
(2) CH_3COCH_3
(3) CH_3CH_2CHO
(4) $CH_3CH_2CH_2OH$

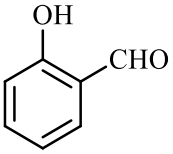
81. $CH_3CH_2CH_2CH_2Br \xrightarrow{alc.KOH} A \xrightarrow[(ii)H_2O_2/OH^-]{(i)B_2H_6/THF} B \xrightarrow[576\,K]{Cu} C$
The product 'C' in the above reaction;
(1) $CH_3CH_2CH_2CH_2OH$
(2) $CH_3CH_2CH_2COOH$
(3) $CH_3CH_2CH_2CHO$
(4) $CH_3CH_2CH=CH_2$

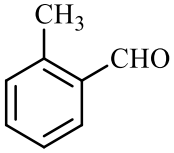
82. **Assertion (A):** We can differentiate 1°, 2° and 3° alcohols by Lucas reagent.
Reason (R): Lucas reagent is a mixture of concentrated HCl and anhydrous $ZnCl_2$ in the ratio 1 : 1.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

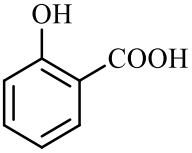
83.



The major product 'D' in the above sequence of reaction is;
(1) 

(2) 

(3) 

(4) 

84. Which of the following acidic order is **correct**?

(1) o-chlorophenol > m-chlorophenol > p-chlorophenol > phenol

(2) p-chlorophenol > phenol > o-chlorophenol > m-chlorophenol

(3) phenol > p-chlorophenol > o-chlorophenol > m-chlorophenol

(4) m-chlorophenol > phenol > p-chlorophenol > o-chlorophenol

85. **Assertion (A):** The boiling point of phenol is more than that of chlorobenzene.

Reason (R): The molecular mass of chlorobenzene is more than that of phenol.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

SECTION-B

86. $\text{Phenol} \xrightarrow[\text{(ii) } CCl_4]{\text{(i) NaOH}} B \xrightarrow[\text{(iv) dil.HCl}]{\text{(iii) NaOH}} C \xrightarrow{(CH_3CO)_2O} D$

The **correct** IUPAC name of product 'D' in the above reaction is;

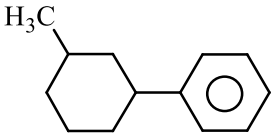
(1) Salicylaldehyde

(2) 2-Hydroxybenzoic acid

(3) Salicylic acid

(4) 2-Acetoxybenzoic acid

87. The **correct** IUPAC name of the given compound is;



(1) 1-Benzene-3-methylcyclohexane.

(2) 1-(3-Methylcyclohexyl)benzene.

(3) 1-Benzene-3-methylcyclohexane.

(4) 3-Benzene-1-methylcyclohexane.

88. Total number of chain isomers of Pentane is;

(1) 3

(2) 4

(3) 5

(4) 6

89. $CH_3CH_2Br + Mg \xrightarrow{\text{dry ether}} A \xrightarrow{H_2O} B$

The product 'B' in above reaction is;

(1) Methane

(2) Ethene

(3) Ethane

(4) Butene

90. $CH_3CH_2CH_2CH_2CH_2Br \xrightarrow{\text{alc.KOH}} A \xrightarrow[CCl_4]{HCl} B \xrightarrow[\text{dry ether}]{Na} C$

The **correct** IUPAC name of product 'C' is;

(1) 2,2-Dimethylhexane

(2) 2,2-Dimethyloctane

(3) 2,4-Dimethyloctane

(4) 4,5-Dimethyloctane

91. Which of the following sets of quantum numbers do **not** belong to p-subshell?

(1) n = 3, l = 2, m = 0, s = $+\frac{1}{2}$

(2) n = 4, l = 0, m = 0, s = $-\frac{1}{2}$

(3) n = 5, l = 1, m = –1, s = $+\frac{1}{2}$

(4) Both (1) and (2)

92. What is the value of frequency when an electron transits from n = 4 to n = 3 in hydrogen atom?
[h = 6.626×10^{-34} Js]

(1) 1.6×10^{14} sec^{-1}

(2) 1.5×10^{15} sec^{-1}

(3) 1.4×10^{15} sec^{-1}

(4) 1.6×10^{15} sec^{-1}

93. 10 mL of N HCl 40 mL of $\frac{N}{2}$ H_2SO_4 and 60 mL $\frac{N}{3}$ HNO_3 are mixed together and the volume made to 2 litre, then the normality of the resulting solution is;

(1) $\frac{N}{5}$ (2) $\frac{N}{10}$

(3) $\frac{N}{20}$ (4) $\frac{N}{40}$

94. The mole fraction of water in a solution of HCl is 0.78. Calculate the molality of the solution;

(1) 1.555 m (2) 15.95 m

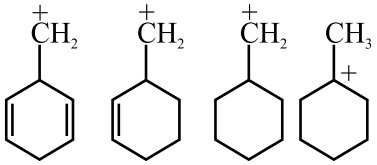
(3) 15.99 m (4) 1.599 m

95. **Statement I:** Boron and oxygen have lower ionisation energies as compared to beryllium and nitrogen respectively.

Statement II: Mg has higher ionisation energy than Na and Al.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

96. Arrange in decreasing order of stability of carbocation;



(1) I > II > III > IV
(2) I > II > IV > III
(3) III > II > I > IV
(4) IV > III > II > I

97. A 5.0 litre cylinder contained 10 moles of H_2 gas at 27ºC. Due to leakage, entire gas escaped into the atmosphere. The atmoshpheric pressure is 1 atm. Calculate the work done by the gas assuming H_2 gas to be an ideal gas;

(1) +24.4 kJ
(2) –24.4 kJ
(3) +20.4 kJ
(4) –20.4 kJ

98. **Assertion (A):** If ΔS_{total} is positive, the process is spontaneous in the direction as mentioned.

Reason (R): The change in entropy (ΔS) is an extensive property and unit of entropy is $JK^{-1}\ mol^{-1}$.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

99. Match of **List-I** with **List-II** and choose the **correct** option.

List-I (Compounds)		**List-II (Oxidation state of central atom)**	
(A)	C_3O_2	(I)	+6
(B)	$Na_2S_4O_6$	(II)	$+\frac{16}{3}$
(C)	Br_3O_8	(III)	$+\frac{4}{3}$
(D)	CrO_5	(IV)	$+\frac{5}{2}$
(E)	MnO_4^-	(V)	+7

(1) A-III, B-IV, C-II, D-I, E-V
(2) A-II, B-IV, C-III, D-I, E-V
(3) A-III, B-IV, C-I, D-II, E-V
(4) A-III, B-IV, C-II, D-V, E-I

100. **Statement I:** The oxidation state of B in $NaBH_4$ is –3.

Statement II: In $S_4O_6^{2-}$, the oxidation state of each sulphur is +5.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

(BOTANY)

SECTION-A

101. The taxonomic category 'family' lies between;

(1) division and order.
(2) genus and species.
(3) genus and order.
(4) class and order.

102. Roquefort cheese is ripened using a/an;

(1) bacterium.
(2) algae.
(3) fungus.
(4) mycoplasma.

103. Read the following statements w.r.t post-fertilisation changes in angiosperms.

Statement I: Integuments of ovules harden as tough protective seed coats.

Statement II: The integuments remain as a small pore in the seed coat.

Choose the **correct** option.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

104. Match **List-I** with **List-II** to find out the **correct** option.

List-I (Compound)		**List-II (Source)**	
I.	Citric acid	A.	*Aspergillus niger*
II.	Butyric acid	B.	*Clostridium butylicum*
III.	Acetic acid	C.	*Acetobacter aceti*
IV.	Ethanol	D.	*Saccharomyces cerevisiae*

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	A	D	B	C
(3)	C	B	D	A
(4)	A	B	C	D

105. Choose the **incorrect** statement w.r.t biological treatment of sewage water.
(1) Involves filtration and sedimentation.
(2) Flocs are formed.
(3) Microbes are used.
(4) Performed until the BOD of sewage water is reduced.

106. On the basis of shape; bacteria are grouped under_____ categories.
(1) four
(2) five
(3) three
(4) two

107. Choose the **incorrectly** matched pair.
(1) *Rhizobium* - fixes atmospheric nitrogen in symbiotic condition
(2) *Azospirillum* - fixes atmospheric nitrogen in free-living state
(3) *Glomus* - forms lichen
(4) *Bacillus thuringiensis* - spores available as sachets

108. Peat is obtained from;
(1) *Marchantia*
(2) *Polytrichum*
(3) *Sphagnum*
(4) *Cycas*

109. **Assertion (A):** Bottled fruit juices bought from the market are clearer as compared to those made at home.
Reason (R): Bottled fruit juices are clarified by the use of lipases.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A**) and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

110. The phase of cell cycle between two successive M-phases is called;
(1) interkinesis. (2) S-phase.
(3) interphase. (4) G_0 phase.

111. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
I.	Hershey and Chase	A.	Proved that DNA is the genetic material
II.	Watson and Crick	B.	Proposed double helix model for the structure of DNA
III.	Avery, MacLeod and McCarty	C.	Discovered that proteases and RNases did not affect transformation
IV.	Griffith	D.	Transformation in bacteria

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	A	D	B	C
(3)	A	B	C	D
(4)	C	B	A	D

112. A flower is a modified ____**A**____ wherein the ____**B**____ changes to floral meristem.
(1) A- root, B- root apical meristem
(2) A- node, B- root apical meristem
(3) A- internode, B- shoot apical meristem
(4) A- shoot, B- shoot apical meristem

113. Assigning a **'+'** sign for beneficial, **'–'** sign for detrimental and '0' for neutral interaction, select the **correctly** matched pair from the given interactions.
(1) Commensalism: +, +
(2) Amensalism: –, –
(3) Mutualism: 0, 0
(4) Parasitism: +, –

114. Sclerenchyma cells are;
(1) usually dead and with protoplast.
(2) usually dead and without protoplast.
(3) usually living and with protoplast.
(4) usually living and without protoplast.

115. Mark **true (T)** and **false (F)** for the following statements and choose the **correct** option.
A. In general, carnivores appear to be more adversely affected by competition than herbivores.
B. MacArthur showed that five closely related species of warblers living on the same tree were able to avoid competition and co-exist due to behavioural differences in their foraging activities.

	A	**B**
(1)	T	T
(2)	T	F
(3)	F	F
(4)	F	T

116. Match **List-I** with **List-II** to find out the **correct** option.

List-I		**List-II**	
I.	Host in brood parasitism	A.	Compete for zooplanktons in the lake
II.	Barnacles growing on the back of a whale	B.	Commensal relationship
III.	Visiting flamingoes and resident fishes in shallow south American lakes	C.	Crow
IV.	Fig and pollinator wasp	D.	Co-evolution

	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	A	D	B	C
(3)	C	B	A	D
(4)	A	B	C	D

117. Which of the following statement(s) is/are **incorrect**?
A. Glycocalyx is outermost layer of cell envelope in bacteria.
B. All three layers of bacterial envelope have same function.
C. Bacteria can be classified into two groups on the basis of differences in the cell envelope.
D. Bacteria can be classified on the basis of gram staining.
(1) B only (2) C only
(3) A and D only (4) A and C only

118. Under normal conditions, what are the most important factors that influence population density?
(1) Births and immigration.
(2) Emigration and deaths.
(3) Births and deaths.
(4) Immigration and emigration.

119. In a pond ecosystem, which of the following is a consumer?
(1) Algae
(2) Zooplankton
(3) Fungi
(4) Bacteria

120. The kangaroo rat in _____**A**_____ American deserts is capable of meeting all its water requirements through its _____**B**_____. **A** and **B**, respectively, are;
(1) south, internal fat oxidation.
(2) south, internal protein oxidation.
(3) north, internal fat oxidation.
(4) north, internal protein oxidation.

121. **Statement I:** Of the incident solar radiation less than 50 per cent of it is photosynthetically active radiation (PAR).
Statement II: Plants capture only 20-30 per cent of the PAR.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

122. The process of degradation of detritus into simple organic substances by bacterial and fungal enzymes during decomposition is called;
(1) fragmentation. (2) leaching.
(3) catabolism. (4) humification.

123. A bivalent is;
(1) a pair of non-homologous chromosomes.
(2) a pair of synapsed homologous chromosomes.
(3) formed during diakinesis.
(4) X-shaped structure.

124. In an ecosystem, what will be the amount of energy available at T_2 level, if the energy at 4^{th} trophic level is 10 J?
(1) 0.1 J (2) 1 J
(3) 1000 J (4) 100 J

125. Which ecological pyramid is always upright?
(1) Pyramid of biomass
(2) Pyramid of energy
(3) Pyramid of number
(4) All of these

126. **Assertion (A):** There are certain limitations of ecological pyramids.
Reason (R): The ecological pyramids assume a complex food chain.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

127. The annual net primary productivity of the oceans is;
(1) 170 billion tons. (2) 55 billion tons.
(3) 115 billion tons. (4) 70 billion tons.

128. Among the following, the recessive trait of garden pea observed by Mendel is;
(1) Axial position of flower.
(2) Green colour of pod.
(3) Violet colour of flower.
(4) Green colour of seed.

129. Which law of inheritance is used to explain the expression of only one of the parental characters in a monohybrid cross in the F_1 and the expression of both in the F_2 generation?
(1) Law of dominance
(2) Law of segregation
(3) Law of independent assortment
(4) None of these

130. The characters present in wild *Drosophila* are;
(1) red eye and miniature wings.
(2) yellow body and long wings.
(3) red eye and brown body.
(4) brown body and miniature wings.

131. **Statement I:** In 1902, de Vries, Correns and von Tschermak independently rediscovered Mendel's results on the inheritance of characters.
Statement II: By 1900, the chromosome movement during meiosis had been worked out.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

132. The mechanism of sex-determination is similar in;
(1) *Drosophila* and birds.
(2) birds and honey bee.
(3) humans and *Drosophila.*
(4) honey bee and grasshopper.

133. Choose the **incorrect** statement from the following.
(1) In pleiotropy, single gene produces more than one effect.
(2) Starch synthesis in pea seeds is controlled by more than one gene.
(3) Human skin colour is the example of polygenic inheritance.
(4) Morgan performed his experiment on *Drosophila*.

134. Pedigree analysis is **not** possible for;
(1) Cystic fibrosis
(2) Sickle-cell anaemia
(3) Thalassemia
(4) Turner's syndrome

135. The **correct** set of symptoms/features for Down's syndrome is;
(1) Gynaecomastia, trisomy of 21^{st} chromosome, round head.
(2) Trisomy of 21^{st} chromosome, round head, broad palm.
(3) Rudimentary ovaries, broad palm, sterile females.
(4) 44 + XXY condition, retarded physical, psychomotor and mental development.

SECTION-B

136. **Statement I:** The first antibiotic was discovered by Alexander Fleming.
Statement II: This antibiotic was extensively used to treat American soldiers wounded in World War I.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

137. During Calvin cycle, carbohydrate is formed during;
(1) carboxylation stage.
(2) regeneration stage.
(3) reduction stage.
(4) both 1 and 2.

138. The gases which evolve from the anaerobic sludge digester constituting biogas are;

(1) methane, sulphur dioxide, carbon dioxide.
(2) carbon dioxide, hydrogen chloride, methane.
(3) methane, hydrogen chloride and carbon dioxide.
(4) methane, carbon dioxide, hydrogen sulphide.

139. **Assertion (A):** A plant species, which makes its own food, cannot survive alone.
Reason (R): It needs soil microbes to break down the organic matter in soil and return the inorganic nutrients for absorption.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

140. In glycolysis, fructose 1, 6 – bisphosphate splits into;

(1) PGAL and BPGA.
(2) Glyceraldehyde – 3 – phosphate and 2 – phosphoglyceric acid.
(3) Glyceraldehyde – 3 – phosphate and dihydroxyacetone phosphate.
(4) Fructose – 6 – phosphate and fructose – 1 – phosphate.

141. In the *Verhulst-Pearl Logistic Growth* equation, K represents;

(1) asymptote.
(2) carrying capacity.
(3) population density.
(4) intrinsic rate of natural increase.

142. A species whose distribution is restricted to a small geographical area because of the presence of a competitively superior species, is found to expand its distributional range dramatically when the competing species is experimentally removed. This is called;

(1) Gause's 'Competitive Exclusion Principle'
(2) Competitive release
(3) Predation
(4) Resource partitioning

143. Match **List-I** containing PGR with the plants in **List-II** associated with their discovery and choose the **correct** option.

List-I		**List-II**	
I.	Auxin	A.	Tobacco
II.	Gibberellin	B.	Rice
III.	Cytokinin	C.	Orange
IV.	Ethylene	D.	Oats

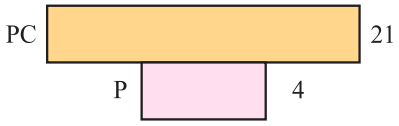
	I	**II**	**III**	**IV**
(1)	D	C	B	A
(2)	A	D	B	C
(3)	D	B	A	C
(4)	A	B	C	D

144. Mark the following statements as **true (T)** or **false (F)** and choose the **correct** option.

A. Decomposition rate is slower if detritus is rich in nitrogen and sugars.
B. Temperature and soil moisture are the most important climatic factors that regulate decomposition.

	A	**B**
(1)	F	T
(2)	F	F
(3)	T	T
(4)	T	F

145. The given ecological pyramid represents;



(1) Pyramid of numbers in a grassland ecosystem
(2) Pyramid of biomass in terrestrial ecosystem
(3) Pyramid of biomass in sea
(4) Pyramid of energy in tree ecosystem

146. **Statement I:** In the polar seas aquatic mammals like seals have a thick layer of fat (blubber) below their skin that acts as an insulator and reduces loss of body heat.
Statement II: Desert lizards lack the physiological ability that mammals have to deal with the high temperatures of their habitat, but manage to keep their body temperature fairly constant by behavioural means.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

147. Pick the **odd** one out w.r.t sickle cell anaemia.
(1) It is a chromosomal disorder.
(2) Caused due to single amino acid substitution in polypeptide chain.
(3) Mutant haemoglobin is produced.
(4) (Hb^SHb^S) genotype shows the diseased phenotype.

148. **Assertion (A):** The inborn error of metabolism in humans is inherited as the autosomal recessive trait.
Reason (R): In affected individuals, phenylalanine is accumulated and converted into phenylpyruvic acid and other derivatives.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A**) and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

149. PGRs are;
(1) small, simple molecules of diverse chemical composition.
(2) large, complex molecules of diverse chemical composition.
(3) large, simple molecules of diverse chemical composition.
(4) small, complex molecules of diverse chemical composition.

150. The blood-cholesterol lowering agent statins are obtained from a;
(1) bacterium.
(2) yeast.
(3) virus.
(4) protozoan.

(ZOOLOGY)

SECTION-A

151. If Cowper's gland /Bulbourethral gland is removed which of the following will be affected?
(1) Sexual attraction.
(2) Capacitation of sperms.
(3) Hardness of penis.
(4) Copulation and fertilisation.

152. With repeated use of drugs, the tolerance level of the receptors present in our body_____.
(1) Increases
(2) First increases and then decreases
(3) Decreases
(4) First decreases and then increases

153. **Assertion (A)**: Periodic abstinence is a method in which couples abstain from coitus during day 5 to day 8 of menstrual cycle.
Reason (R): Abstaining from coitus during fertile period prevents conception.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

154. What is the result of loss of contact inhibition property of cell?
(1) Cell death
(2) Tumors
(3) AIDS
(4) Withdrawl syndrome

155. At which stage of spermatogenesis sperm acquire their whole structural maturity?
(1) Spermiogenesis
(2) Growth phase
(3) Multiplication phase
(4) Maturation phase

156. In which method of cancer treatment, tumor cells are irradiated lethally?
(1) Surgery
(2) Radiotherapy
(3) Chemotherapy
(4) Immunotherapy

157. Which of the following technique is used to treat infertility or low sperm count among males?
(1) Artificial Insemination (AI).
(2) Zygote Intra Fallopian Transfer (ZIFT).
(3) Gamete Intra Fallopian Transfer (GIFT).
(4) *In vivo* Fertilization.

158. After maturation the lymphocytes migrate to;
A. Bone marrow
B. Spleen
C. Tonsils
D. Thymus
E. Peyer's patches
F. Appendix
(1) A, B, C, D, E and F
(2) A and D
(3) B, C, E and F
(4) A, B, C, D and E

159. Ovulation in the human female normally takes place during the menstrual cycle;
(1) at the end of the proliferative phase.
(2) at the mid secretory phase.
(3) just before the end of the secretory phase.
(4) at the beginning of the proliferative phase.

160. How many of given IUDs in the box are hormone-releasing IUDs?

LNG-20, Copper-T, Lippe's loop, Multiload-375, Progestasert, Cu7, Mifepristone

(1) Four
(2) Three
(3) Two
(4) Seven

161. How many cleavages are required for formation of 16 blastomeres?
(1) 2
(2) 8
(3) 4
(4) 6

162. Which is **true** with respect to role of our immune system?
A. Allergic reaction
B. Metabolic reactions
C. Auto-immune disease
D. Graft rejection
(1) A, B, C and D
(2) A, B and C
(3) A, B and D
(4) A, C and D

163. If detected and treated early, all of the following STDs are curable **except**;
(1) Genital Herpes
(2) Syphilis
(3) Genital warts
(4) Trichomoniasis

164. Clitoris is present at the upper junction of;
(1) Labia majora (2) Mons pubis
(3) Hymen (4) Labia minora

165. From the list given below, total number of drugs reduces symptoms of allergy are;

Histamine, Adrenaline, Nor adrenaline, Anti histamine, Steroids, Serotonin

(1) Two (2) Three
(3) Four (4) Five

166. How many of the following statements are **not** correct for Medical Termination of Pregnancy (MTP) Amendment Act?
A. It was enacted in 1951 with the intention of reducing the incidence of legal abortion and consequent maternal mortality and morbidity.
B. A pregnancy may be terminated on certain considered grounds within the first 12 weeks of pregnancy on the opinion of one registered medical practitioner.
C. If the pregnancy has lasted between 12-24 weeks, four or more registered medical practitioners must be of the opinion.
D. Various factors such as substantial risk to unborn child as well as maternal health are considered during MTP.
(1) Three (2) One
(3) Two (4) Four

167. **Statement I**: The bulbourethral gland is a male sex accessory gland.
Statement II: Each seminiferous tubule is lined on its inside by three type of cells.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

168. Mark the **correct** set of statement.
A. Yoga has been practised to achieve physical and mental health.
B. Infectious diseases are very common and everyone of us suffers from these at sometime or other.
C. AIDS is an infectious disease.
D. Cancer is non - infectious disease.
E. Healthy persons bring economic prosperity.
(1) A, B and C (2) B, C, D and E
(3) C and D (4) A, B, C, D and E

169. Which antibody is produced during response to pollens, mites in dust, animal danger etc. in our body?

(1) IgG (2) IgD
(3) IgE (4) IgA

170. Which of the following are given prime consideration under the reproductive health-care programmes?

A. Prevention of STIs
B. Early detection of STIs
C. Cure of STIs
(1) A and C
(2) B and C
(3) A and B
(4) A, B and C

171. How many of the following given side effects are common in both male and female by the use of steroids (drugs)?

Masculinisation, increased aggressiveness, mood swings, depression, premature baldness

(1) Three (2) Four
(3) Five (4) Six

172. Which of the following is **not** correct with respect to human reproduction?

(1) There is a difference between the reproductive events of males and females.
(2) Continuation of sperm formation in old men.
(3) Ovum production in females after menarche ceases.
(4) Reproductive events occur after puberty.

173. All of the following blocks gamete transport **except**;

(1) Vasectomy (2) Nirodh
(3) Saheli (4) Vaults

174. Match **List-I** with **List-II** and choose the **correct** option.

List-I		**List-II**	
(A)	Widal test	(I)	Activation of B-cell
(B)	ELISA test	(II)	Typhoid fever
(C)	Helper T-cells	(III)	AIDS
(D)	Treatment of cancer	(IV)	Immunotherapy

	A	**B**	**C**	**D**
(1)	II	III	I	IV
(2)	III	II	IV	I
(3)	IV	II	III	I
(4)	II	I	III	IV

175. Leydig cells;

(1) are present in seminiferous tubules and secrete androgens.
(2) are present in seminiferous tubules and help in maturation of sperms.
(3) are present in interstitial space and secrete androgens.
(4) are present in interstitial space and help in maturation of sperms.

176. Dense irregular connective tissue;

(1) present in the skin.
(2) present beneath the skin.
(3) present above the skin.
(4) absent in skin.

177. In which of the following animals, digestive tract has additional chambers like crop and gizzard?

(1) *Pavo, Psittacula, Corvus*
(2) *Corvus, Columba, Chamel*eon
(3) *Bufo, Balaenoptera, Bangarus*
(4) *Catla, Columba, Crocodilus*

178. Which of the following statements regarding enzyme inhibition is **correct**?

(1) Competitive inhibition is seen when a substrate competes with an enzyme for binding to an inhibitor protein.
(2) Non competitive inhibitor binds to active site on enzyme.
(3) Competitive inhibition is seen when the substrate and the inhibitor compete for the active site on the enzyme.
(4) Non-competitive inhibition of an enzyme can be overcome by adding large amount of substrate.

179. Which of the following would have the same O_2 content?

(1) Blood entering the lungs and blood leaving the lungs.
(2) Blood entering the right side of the heart and blood leaving the right side of the heart.
(3) Blood entering the right side of the heart and blood leaving the left side of the heart.
(4) Blood entering the tissue capillaries and blood leaving the tissue capillaries.

180. Antigen binding site on antibody is present on which terminal of peptide chain?

(1) N and C- terminal both
(2) C- terminal
(3) N- terminal
(4) Between N and C terminal

181. Mark the **incorrect** match.
(1) B and T lymphocytes - Responsible for immune response of the body.
(2) Platelets - Formed by the fragmentation of megakaryocyte.
(3) Basophil - Secrete histamine and is phagocytic in nature.
(4) Eosinophil- Resist infections and are associated with allergic reaction.

182. Which one of these animals is **not** a homeotherm?
(1) *Macropus*
(2) *Chelone*
(3) *Camelus*
(4) *Psittacula*

183. A person is having problems with calcium and phosphate metabolism in his body. Which one of the following gland may not be functioning properly?
(1) Parotid
(2) Pancreas
(3) Adrenal cortex
(4) Parathyroid

184. Which of the following statements are **incorrect**?
A. Lactational amenorrhea method is based on the fact that ovulation and therefore the cycle occur during the period of intense lactation following parturition.
B. Natural barriers have low chances of failure.
C. By abstaining from coitus during ovulation, conception could be prevented.
D. Withdrawal or coitus interruptus is the method in which the male partner withdraws his penis from the vagina just before ejaculation so as to avoid insemination.
(1) A and B
(2) C and D
(3) A and C
(4) B and D

185. Select the **correct** statement.
(1) Glucagon is associated with hypoglycaemia.
(2) Insulin acts on pancreatic cells and adipocytes.
(3) Insulin is associated with hyperglycaemia.
(4) Glucocorticoids stimulate gluconeogenesis.

SECTION-B

186. **Assertion (A)**: Oogenesis is initiated during the embryonic development stage.
Reason (R): After birth oogonia are added and developed to form Graafian follicle.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

187. Mammals are said to have double circulation. It means;
(1) blood vessels are paired.
(2) there are two types of blood vessels attached to every organ.
(3) there are two systems, one from the heart to the lungs and second from lungs to back to the heart.
(4) the blood circulates twice through the heart.

188. Which of the following hormones is **mismatched** with the stated function?

(1)	ACTH	Stimulates the adrenal cortex to release cortisol
(2)	Oxytocin	Stimulates water reabsorption by the kidneys
(3)	Prolactin	Regulates the growth of mammary glands and milk production in them
(4)	TSH	Promotes the synthesis and secretion of thyroid hormones

189. Which of the following statements is **correct** with respect to immunity?
(1) Antibodies are protein molecules, each of which has four light chains.
(2) Rejection of a kidney graft is the function of B - lymphocytes.
(3) Preformed antibodies are injected to treat the snakebite.
(4) The antibodies against small pox pathogens are produced by T - lymphocytes.

190. **Statement I**: Glans penis is covered by prepuce.
Statement II: After vasectomy, sperm immediately disappear in semen.
(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

191. Match **List-I** with **List-II** and choose the **correct** option.

List-I		List-II	
(A)	ZIFT	(I)	More than 8 blastomeres transferred into the uterus
(B)	*In-vivo* fertilisation	(II)	Fusion of gametes within the female
(C)	ICSI	(III)	Upto 8 blastomeres transferred into the fallopian tube
(D)	IUT	(IV)	Special technique in which sperm is directly injected into the ovum

	A	B	C	D
(1)	I	IV	II	III
(2)	III	II	IV	I
(3)	III	II	I	IV
(4)	I	II	IV	III

192. Choose the option that correctly states the given statement as **true (T)** or **false (F).**

A. The male reproductive system is located in the abdominal region.
B. The urethra originates from the urinary bladder.
C. Each ovary is about 5 to 7 cm in length.
D. The presence or absence of hymen is not a reliable indicator of virginity or sexual experience.

	A	B	C	D
(1)	F	T	F	T
(2)	F	T	T	T
(3)	F	F	F	T
(4)	T	T	F	T

193. **Assertion (A)**: Size of thymus decreases with the advancement of age.
Reason (R): Thymosin secretion decreases hence immunity decreases in old persons.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

194. In females, circulating levels of estrogen and progesterone control the release of;

(1) inhibin. (2) thyroxin.
(3) androgen. (4) GnRH.

195. **Assertion (A)**: In humans, the male gametes determines whether the child produced will be male or female.
Reason (R): Sex determination in humans is a polygenic trait which depends upon a cumulative effect of some genes on X- chromosome.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

196. **Assertion (A)**: In tubectomy, a small part of the vas deferens is removed or tied up through a small incision on the scrotum.
Reason (R): Sterilisation techniques are highly effective but their reversibility is very poor.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

197. All vertebrates are chordates but all chordates are not vertebrates, why?

(1) Ventral hollow nerve cord remains throughout life in some chordates.
(2) All chordates possess vertebral column.
(3) All chordates possess notochord throughout their life.
(4) Notochord is replaced by vertebral column in adult of some chordates.

198. In cockroach, identify the parts of the foregut in **correct** sequence.

(1) Mouth → Crop → Pharynx → Oesophagus → Gizzard
(2) Mouth → Gizzard → Crop → Pharynx → Oesophagus
(3) Mouth → Pharynx → Oesophagus → Crop → Gizzard
(4) Mouth → Oesophagus → Pharynx → Crop → Gizzard

199. Identify a **true** statement regarding protein.

(1) Tertiary structure is necessary for biological activity of protein.

(2) They are homopolymers.

(3) Consists of branched chains of amino acids.

(4) Dietary proteins are the only source of non-essential amino acids.

200. Due to increasing air-borne allergens and pollutants, many people in urban areas are suffering from respiratory disorder causing wheezing due to;

(1) benign growth on mucous lining of nasal cavity.

(2) inflammation of bronchi and bronchioles.

(3) proliferation of fibrous tissues and damage of the alveolar walls.

(4) reduction in the secretion of surfactants by pneumocytes.

■■■

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